

ENGINEERING SOFTWARE DEVELOPMENT in the WATER RESOURCES RESEARCH LABORATORY

Contact: Tony Wahl, 303-445-2155, twahl@do.usbr.gov

The Water Resources Research Laboratory has a long history of developing engineering software to meet specialized analysis needs related to water resources engineering. Past examples include:

- **[RADGAT](#)** software for determining discharge through canal radial gates
- **Engineering Monograph 42: Cavitation in Chutes and Spillways** — The software provided with this monograph can be used to analyze water surface profiles and cavitation potential in high-velocity spillway flows, accounting for effects of air entrainment and surface roughness and offsets
- **HDCOW** – Head-discharge curves for outlet works, developed cooperatively with Waterways and Concrete Dams Group for analysis of outlet works discharge capacities.

In recent years, dramatic advances in computer technology have made it possible to develop fast, efficient, user-friendly engineering applications that promote water resource engineering objectives and make new analyses possible. Recent WRRL software developments include:

- **[WinFlume](#)** — Windows-based software for the design and calibration of long-throated flumes and broad-crested weirs. This project was a cooperative effort between Reclamation, the Agricultural Research Service, and the International Institute for Land Reclamation and Improvement. The software is used throughout the U.S. and in more than 40 foreign countries.

- **[WinADV](#)** — Windows-based software for analysis and post-processing of data collected from acoustic Doppler velocimeter (ADV) probes. Since their development 8 years ago, ADV's have become the most commonly used velocity-measurement instrument in many hydraulics laboratories. The WinADV program was developed in the WRRL and is used by hydraulics laboratories worldwide.
- **GoldDFE** — The GoldDFE software is presently under development by Golder & Associates in cooperation with Reclamation's research program on dam foundation erosion. The software will simulate erosion of earth/rock materials as a result of large spillway flows or dam overtopping events.
- **[PIDSim](#)** — This is a simplified, educational simulation of the PID control algorithm, applied to a canal automation situation. It demonstrates the tuning of the algorithm and the influence of secondary factors such as noisy sensors, deadbands, sensor filtering, etc.
- **[Coanda-Effect Screen Performance](#)** — An end product of the Coanda-effect screen research program is a computer program that can be used to analyze and design Coanda-effect screens, used for low-maintenance debris and fish screening.
- **[BFI](#)** — BFI computes the base-flow index for small natural drainage basins (the ratio of base flow to total runoff, on an annual basis). The program uses an objective, repeatable base flow separation technique that can be easily applied to large data sets.